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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/765,309	01/27/2004	Junji Nishii	10873.1394US01	9395
52835	7590	05/10/2006	EXAMINER	
HAMRE, SCHUMANN, MUELLER & LARSON, P.C.			STAHL, MICHAEL J	
P.O. BOX 2902-0902				
MINNEAPOLIS, MN 55402			ART UNIT	PAPER NUMBER
			2874	

DATE MAILED: 05/10/2006

Please find below and/or attached an Office communication concerning this application or proceeding.



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APPLICATION NO./ CONTROL NO.	FILING DATE	FIRST NAMED INVENTOR / PATENT IN REEXAMINATION	ATTORNEY DOCKET NO.
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10/765 309

NISHII

EXAMINER
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M. STAHL

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11051

DATE MAILED:

Please find below and/or attached an Office communication concerning this application or proceeding.

Commissioner for Patents

Attached is a copy of the complete Office action that was previously mailed November 30, 2005. Applicant requested remailing of said action because it had a duplicate of page 2 but no page 3 (see letter of December 16, 2005). Accordingly, the response period is restarted from the mailing date of the present Office action.

Rodney Bovernick  
Supervisory Patent Examiner  
Technology Center 2800

MJS

Mike Stahl  
Art Unit 2874  
571-272-2360

<b>Office Action Summary</b>	<b>Application No.</b> 10/765,309	<b>Applicant(s)</b> NISHII ET AL.	
	<b>Examiner</b> Mike Stahl	<b>Art Unit</b> 2874	

**-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --**  
**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

#### Status

- 1) ☐ Responsive to communication(s) filed on \_\_\_\_.
- 2a) ☐ This action is **FINAL**.                      2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

#### Disposition of Claims

- 4) ☒ Claim(s) 1-25 is/are pending in the application.  
     4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-25 is/are rejected.
- 7) ☒ Claim(s) 24 is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

#### Application Papers

- 9) ☒ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 27 January 2004 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.  
     Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
     Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

#### Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).  
     a) ☒ All    b) ☐ Some \* c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.

#### Attachment(s)

- |  |   |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)  | 4) <input type="checkbox"/> Interview Summary (PTO-413)<br>Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)   | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152)             |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)<br>Paper No(s)/Mail Date <u>8/16/04</u> . | 6) <input type="checkbox"/> Other: _____  |

Art Unit: 2874

***Claim Objections***

Claim 24 is objected to because “frame” should be changed to “flame”.

***Specification***

The specification is objected to because “frame” should be changed to “flame” at p. 5 ln. 21 and at p. 15 ln. 29.

***Claim Rejections - 35 USC § 102***

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

Claims 1-5, 7-8, 10-14, and 22-25 are rejected under 35 U.S.C. 102(b) as being anticipated by Fournier et al. (US 5210801).

Claim 1: Fournier discloses an optical element (fig. 2) comprising a structure having at least one convex portion and at least one concave portion **22** formed so as to be adjacent to one of the convex portions, at least one surface of the structure being covered, the optical element having a hollow portion **26**, wherein the at least one surface of the structure is covered with a covering layer **24** formed by a deposition process.

Claim 2: The optical element further comprises a substrate **14**, wherein the structure is placed on the substrate.

Claim 3: The optical element further comprises a substrate **14** and a solid layer **16** stacked on the substrate, wherein the structure is placed on the solid layer.

Claim 4: In an extended embodiment (fig. 5), at least one of the convex portion and the concave portion is disposed so as to have a periodic structure.

Claim 5: At least one of the convex portion and the concave portion is disposed so as to have a one-dimensional periodic structure.

Claim 7: In a related embodiment (fig. 4), the convex portion has a multi-layered structure (i.e., it includes layers **16, 18, 24**).

Claim 8: In the fig. 4 example, the number of convex portions is one, and a plurality of concave portions are formed.

Claim 10: In the fig. 8 embodiment, an optical component for controlling light is placed on the structure.

Claim 11: The optical component is an optical waveguide **52**.

Claim 12: The convex portion and the concave portion are arranged periodically in an alternate manner, and a depth of the concave portion is larger than half the width of the concave portion (col. 13 lns. 9-14). Fournier also teaches a range of values for the arrangement period of 0.3 to 3 microns (col. 13 lns. 15-20). A nominal operating wavelength of 800 nm is mentioned several times in the reference. Thus the disclosed grating period range corresponds to 0.375 to 3.75 times the operating wavelength and is entirely within the range recited by claim 12.

Claim 13: The depth of the concave portion may be more than twice the width of the concave portion (col. 6 lns. 39-42; claim 5).

Claim 14: As shown in fig. 2, the structure includes an upper cladding layer 24, a lower cladding layer 16, and a core layer 18 having a refractive index higher than those of the upper cladding layer and the lower cladding layer, wherein the core layer is interposed between the upper cladding layer and the lower cladding layer, and the structure is placed in the core layer.

Claims 22-25: The process for fabricating the fig. 2 device as described at col. 7 ln. 55 – col. 8 ln. 39 meets the limitations of these claims.

### ***Claim Rejections - 35 USC § 103***

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

Claims 6 and 9 are rejected under 35 U.S.C. 103(a) as being unpatentable over Fournier et al. (cited above).

Claim 6: Fournier does not disclose a two-dimensionally periodic structure. Official notice is taken of the fact that two-dimensionally periodic structures are well known in the art. In particular, the prior art includes many instances of photonic crystals defined by a two-dimensionally periodic array of air holes within a solid layer. The benefits of Fournier's covering process with respect to one-dimensional arrays of air holes (see e.g. col. 2 lns. 10-28 and col. 3 lns. 12-17 and 26-36) are clearly applicable to two-dimensional arrays as well. Thus it would have been obvious to a skilled person to have applied Fournier's teachings to a conventional two-dimensionally periodic air hole structure in order to achieve these benefits.

Claim 9: Fournier does not teach stacking a plurality of the optical elements according to claim 1. It would have been obvious to a skilled person to have stacked a number of the Fournier elements in order to conserve space on a supporting substrate.

Claims 1, 4, 5, and 14-25 are rejected under 35 U.S.C. 103(a) as being unpatentable over Morgan et al. (Photonics Technology Letters article cited in August 16, 2004 information disclosure statement) in view of Fournier et al. (cited above).

Claim 15, 14, and 1: Morgan discloses an optical circuit comprising: a diffraction grating for first-order diffracting incident light; an incident portion (first parabolic mirror); and a focusing portion (second parabolic mirror), wherein the incident portion controls a spread angle of light incident upon the grating, the focusing portion focuses light demultiplexed to light having a plurality of different wavelength components by the grating, and the incident portion and the focusing portion are placed in the core layer. See fig. 2 and sections II and III. Morgan does not disclose an upper cladding layer as required by parent claim 14, and does not use for the

Art Unit: 2874

diffraction grating an optical element having all the structural elements of base claim 1. The grating in Morgan is formed by triangular air holes in the core layer. Fournier teaches that structures having open air holes are beneficial in that they increase the relative index difference as compared to solid-filled holes, but are subject to contamination (col. 2 lns. 10-28), and teaches a way of overcoming this problem (col. 3 lns. 12-17 and 26-43). The solution involves adding an upper cladding layer which seals the holes without filling them (figs. 2 and 5). Since Fournier teaches a solution to a problem which is inherent in the Morgan device, it would have been obvious to a skilled person to have adopted this solution by adding to the Morgan device an upper cladding layer which preserves the various air holes but seals them from contamination. The resultant device would have met the limitations of claims 1, 14, and 15.

Claims 4 and 5: The limitations of these claims are satisfied by the combination proposed above.

Claim 16: At least one of the incident portion and the focusing portion is a concave mirror.

Claim 17: The concave mirror is formed of an interface between the core layer and a space formed in the core layer (the mirror is defined by a deep-etching process which goes completely through the core layer).

Claim 18: The incident portion and the focusing portion are concave mirrors, the concave mirrors are formed of an interface between the core layer and a space formed in the core layer, and a shape of the interface is part of a parabola surface (note first two paragraphs of section II).



Claim 19: Morgan does not disclose the recited relationships. However, these merely represent minimum sizes of the respective elements required to ensure a desired level of optical efficiency for the device. A person of ordinary skill in the art would have been knowledgeable about optical system design and thus would have found it obvious to have derived such relationships for a given layout of the Morgan device in order to optimize its optical throughput.

Claim 20: The incident portion and the focusing portion are concave mirrors, and the optical circuit includes a light input portion for allowing light to be incident upon the incident portion concave mirror, and a plurality of light output portions for combining a plurality of light beams output from the focusing portion concave mirror (fig. 2).

Claim 21: The light input portion and the light output portion are placed in the core layer.

Claims 22-25: The process of manufacturing the proposed combination would have met the limitations of these claims.

### ***Conclusion***

The additional references listed on the attached PTO-892 form are considered relevant to this application.

Inquiries about this letter should be directed to Mike Stahl at 571-272-2360. Inquiries of a general or clerical nature (e.g., a request for a missing form or paper, etc.) should be directed to the technical support staff supervisor at 571-272-1626. Official communications which are eligible for submission by facsimile and which pertain to this application may be faxed to 571-273-8300. Information regarding the status of an application may be obtained from the Patent

Art Unit: 2874

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Mike Stahl *MJS*  
Patent Examiner  
Art Unit 2874

May 1, 2006

  
**SUNG PAK**  
**PRIMARY EXAMINER**